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MOBILE PHONE

Abstract:

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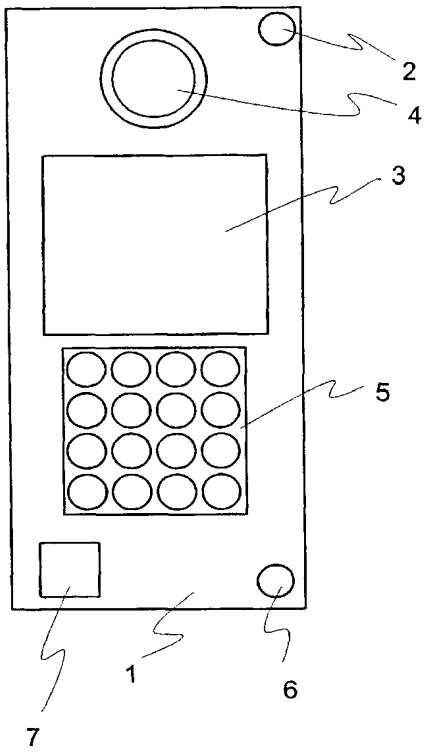
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(54) Title: MOBILE PHONE



(57) Abstract: The invention relates to a mobile phone comprising a camera (4) and a display (3). The invention is characterised in that it further comprises an optical viewfinder (7) with the same operating direction as the capturing direction of the camera (4).

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Mobile phone

The invention relates to a mobile phone comprising a camera and a display.

More and more often mobile phones include a camera that enables capturing still pictures and video clips, as well as their use in video conferences. A usage of this type sets many requirements for the camera provided in the mobile phone; for instance, it must be light in weight, small in size, economical in expenses, and it must have a good picture quality. Further, because we are talking about a mobile phone, it is preferable that its components do not consume a lot of energy.

In one mobile phone, the camera is provided with an optical system (a mirror or a prism), in which case it is possible to shoot in two opposite directions. However, this kind of arrangement takes up a lot of space and requires high-class optics. Moreover, the system is sensitive and does not tolerate rough treatment.

Thus the object of the invention is a mobile phone that enables the capturing of still pictures and video clips, for instance in a video conference. Another object of the invention is to realise an apparatus that includes only few movable parts, endures rough treatment and has a low power consumption.

Said objects are now achieved in a way specified in the appended claims. The mobile phone according to the invention is characterised in that it further comprises an optical viewfinder with a functional direction equal to the capturing direction of the camera.

An optical viewfinder means an arrangement which permeates and aligns rays of light, as well as outlines the view to be seen through the arrangement in question, so that said view gives a good impression of the image created by the camera included in the mobile phone. The direction of use of the optical viewfinder here means the direction in which the viewfinder is arranged to function.

In the simplest form, an optical viewfinder can be a hole of a certain size, extending through the mobile phone, or it may include lenses, mirrors and other elements known as such, for instance those used in ordinary cameras. In connection with the optical viewfinder, there can be arranged various indicators, such as arms, or signal lights with different designs, in order to describe the operation of the mobile phone. As an example, let us mention a signal light indicating the state of the battery.

Thus the mobile phone according to the invention includes only a few movable parts, wherefore it endures even rougher treatment. Moreover, the use of an optical viewfinder is generally known for users of ordinary cameras, i.e. the threshold to the use of a mobile phone according to the invention is low.

According to a preferred embodiment of the invention, the functional direction of the display is essentially the same as the capturing direction of the camera. Said display can be for instance a liquid crystal display; advantageously the display is flat. Further, the display can be switched off while using the optical viewfinder, which reduces the power consumption. A low power consumption is an extremely essential feature in mobile phone components.

For a man skilled in the art, it is obvious that the mobile phone according to the invention can be used for capturing both still pictures and video clips, and that the mobile phone can be provided with an image processing system in order to later view the captured images on the display.

Further, a mobile phone according to the invention can also be provided with a pattern recognition system in order to process the image captured by the camera. The pattern recognition system can be used for instance while the user films himself, in which case the pattern recognition system allows the user to move in front of the camera without deteriorating the image quality.

Moreover, the camera according to the mobile phone of the invention can be provided with an arrangement that enables the adjusting of the angle of view of the camera, i.e. zooming. These arrangements are likewise known as such from ordinary cameras.

In the mobile phone according to the invention, there can further be added an arrangement that enables the use of the camera provided in the mobile phone for example by using a table as a support. Said arrangement can be for example folding or integrated telescoping feet or a rack. By means of said arrangement, it may also be possible to turn the mobile phone in order to point the camera for instance towards the face of a user sitting at the table.

Moreover, the mobile phone according to the invention can be provided with a second camera with a capturing direction essentially different from the capturing direction of the first camera. Preferably the capturing direction of the second camera is opposite to the capturing direction of the first camera, so that the display serves as a viewfinder for the second camera, in similar fashion as above in the case where

the user filmed himself with the first camera. This type of a mobile phone makes it possible to film both the user and the surroundings for instance in video conferences. The mobile phone may also include an arrangement for diminishing the image produced by the camera that films the user, in which case said image can be used as a split-screen image together with the image captured by the first camera. The angle of view of the cameras can also be different. Further, the second camera can be detachable from the mobile phone, in which case the use of a mobile phone for example as a videophone is easier.

The invention is explained in more detail with respect to the appended drawings, wherein

figures 1a and 1b illustrate a mobile phone according to a preferred embodiment of the invention, viewed at the front and at the rear,

figure 2 illustrates the basic principle of operation of a preferred embodiment according to the invention,

figure 3 is a block diagram illustrating the operation of a mobile phone according to a preferred embodiment of the invention, and

figures 4a and 4b illustrate a mobile phone according to another embodiment of the invention, viewed at the front and at the rear.

Figure 1a is a schematical illustration of a mobile phone according a preferred embodiment of the invention, seen at the front. On the front side of the mobile phone 1, i.e. on the side that faces the user when operating the device, there is arranged a loudspeaker 2, a display 3, a camera 4, a keypad 5, a microphone 6 and an optical viewfinder 7. Obviously the camera 4 may also be located in some other place in the mobile phone 1, for example behind the display 3, so that in the display 3, there is arranged an aperture for the lens of the camera 4. Likewise, the other elements can also be arranged in an order different from the one illustrated in the drawing.

Figure 1b is a schematical illustration of a mobile phone 1 according to a first preferred embodiment of the invention, seen at the rear, and the optical viewfinder 7 of the mobile phone 1 is shown in the drawing.

Figure 2 is a schematical illustration of the basic principle of operation of the mobile phone according to a preferred embodiment of the invention. There is shown a mobile phone 1, viewed at the side, and the display 3 of the mobile phone 1, a

camera 4 and an optical viewfinder 7, as well as the mobile phone user in two different positions.

In the first position 8a, the user is set behind the mobile phone 1, i.e. so that he looks through the optical viewfinder of the mobile phone; i.e. the functional direction of the optical viewfinder in the drawing is from left to right. In this position, the user can film his surroundings by means of optical viewfinding.

In the second position 8b, the user is set in front of the mobile phone, facing the camera 4 and the display 3. Advantageously the camera has such features that it is capable of producing a sharp image from a short distance, for instance from a distance of about 10 - 40 cm. In a particularly preferable case, the camera 4 is provided with a wide angle of view. In this position the user can film himself, and the display 3 serves as the viewfinder.

Figure 3 represents a block diagram of the operation of a mobile phone according to a preferred embodiment of the invention. The camera 9 produces a digital image, which is transferred to the image processing block 10. The audio decoding 11, audio encoding 12, the loudspeaker 13 and the microphone 14 all function as in known mobile phones. Likewise, the keypad 15 functions, in similar fashion as in prior art mobile phones, by means of a control block 16. The radio transmitter/receiver 18 also functions as in known mobile phones.

The control block 16 may define the image processing block 10 in many ways. For instance, the control block can show on the display 17 an image captured by the camera 9, or it can combine in the display 17 an image produced by the camera 9 and an image received by radio by a radio receiver 18. The control block 16 may also process said images in different ways, for example diminish, enlarge or produce split-screen images. Moreover, the control block 16 controls the possible indicators 19 of the viewfinder.

Figure 4a is a schematical illustration of a mobile phone 1 according to another embodiment of the invention, seen at the front. On the front side of the mobile phone 1, i.e. on the side that faces the user while operating, there is a loudspeaker 2, a display 3, a first camera 4, a keypad 5, a microphone 6 and an optical viewfinder 7. Obviously the first camera 4 may be located in some other spot in the mobile phone, for instance behind the display 3, so that in the display 3, there is provided an aperture for the lens of the camera 4. The rest of the elements can likewise be arranged in some other order than the one illustrated in the drawing.

Figure 4b is a schematical illustration of a mobile phone 1 according to another embodiment of the invention, viewed at the rear, and there also are illustrated the optical viewfinder 7 of the mobile phone and the second camera 20.

Claims

1. A mobile phone comprising a camera (4) and a display (3), **characterised** in that it further comprises an optical viewfinder (7) with a functional direction equal to the capturing direction of the camera (4).

2. A mobile phone according to claim 1, **characterised** in that the functional direction of said display (3) is essentially the same as the capturing direction of the camera (4).

3. A mobile phone according to claim 1, **characterised** in that the display (3) is arranged to function as a viewfinder by showing the image captured by the camera (4).

4. A mobile phone according to claim 1, **characterised** in that it comprises a pattern recognition system for processing the image produced by the camera (4).

5. A mobile phone according to claim 1, **characterised** in that it further comprises a second camera (20) with a capturing direction essentially different from the capturing direction of the first camera (4).

6. A mobile phone according to claim 1, **characterised** in that the display (3) is a liquid crystal display.

7. A mobile phone according to claim 1, **characterised** in that the display (3) can be switched off while the mobile phone (1) is switched on.

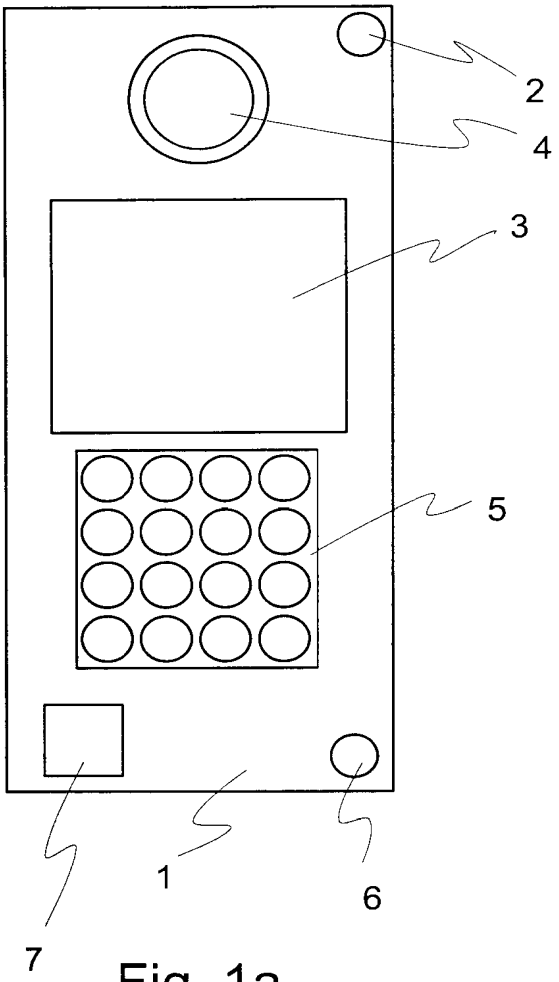


Fig. 1a

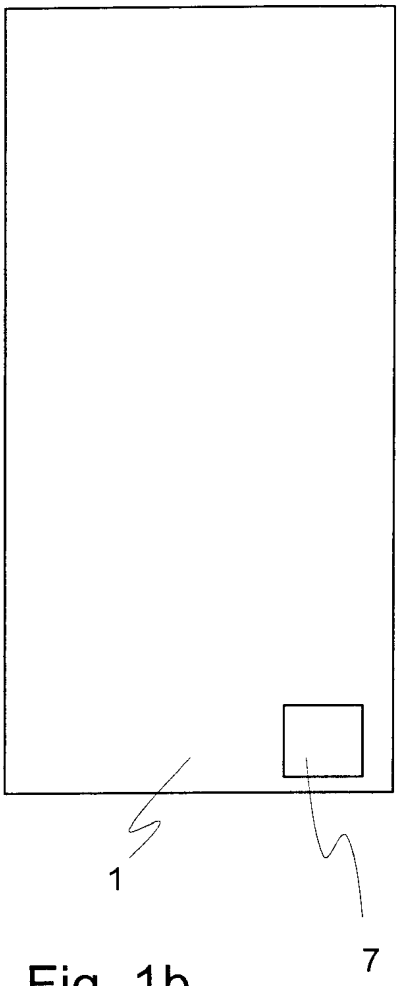


Fig. 1b

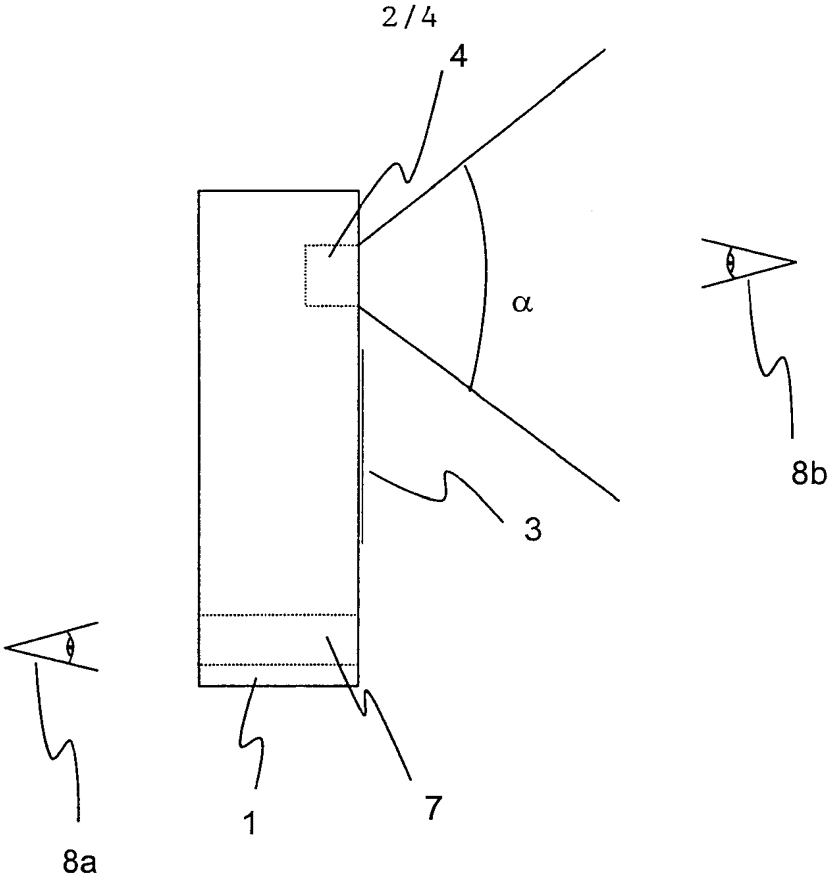


Fig. 2

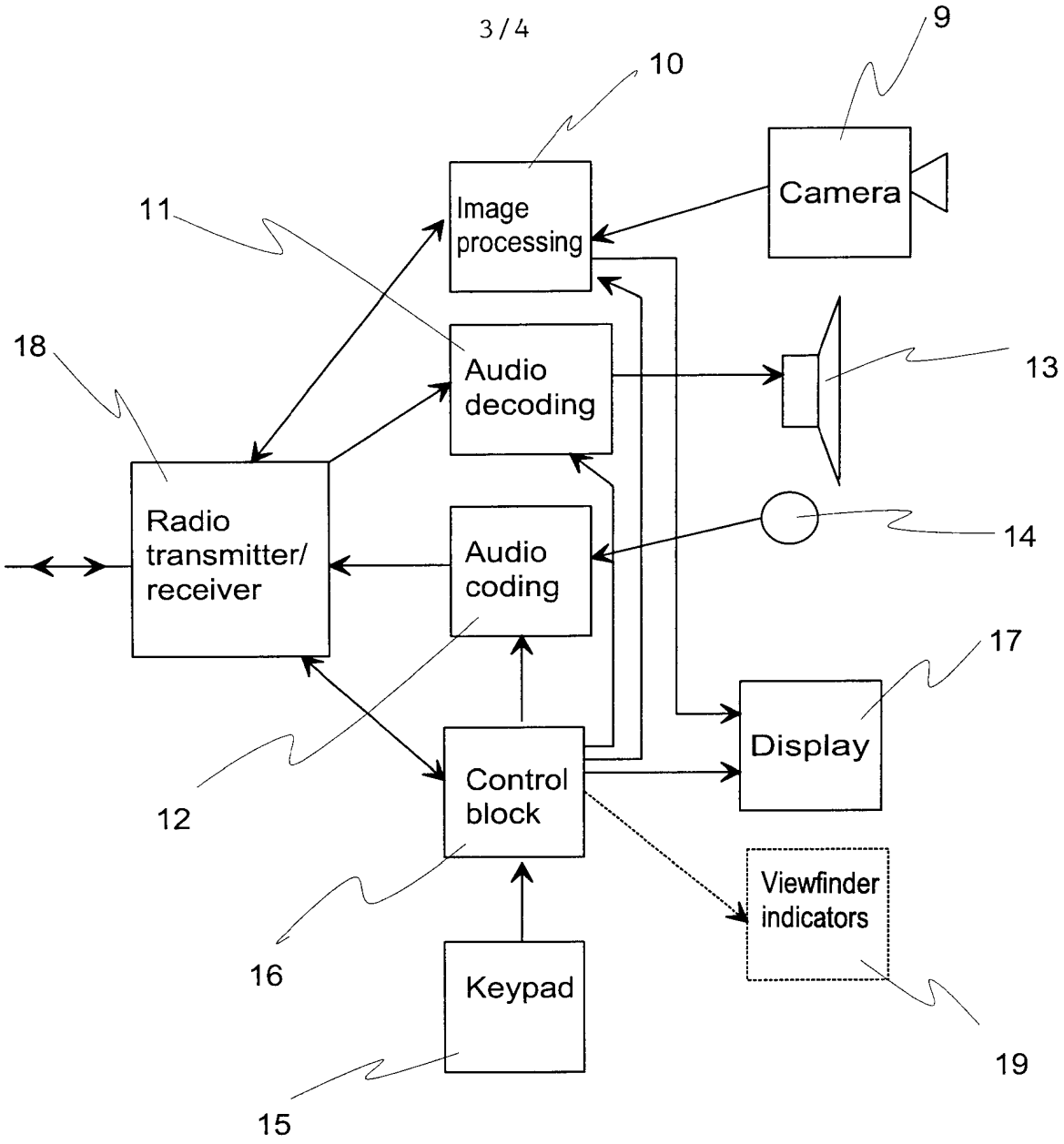

9
10
Camera
Image processing
11
18
Audio decoding
13
Radio transmitter/ receiver
Audio coding
14
17
Display
12
Control block
Viewfinder indicators
16
Keypad
19
15

Fig. 3

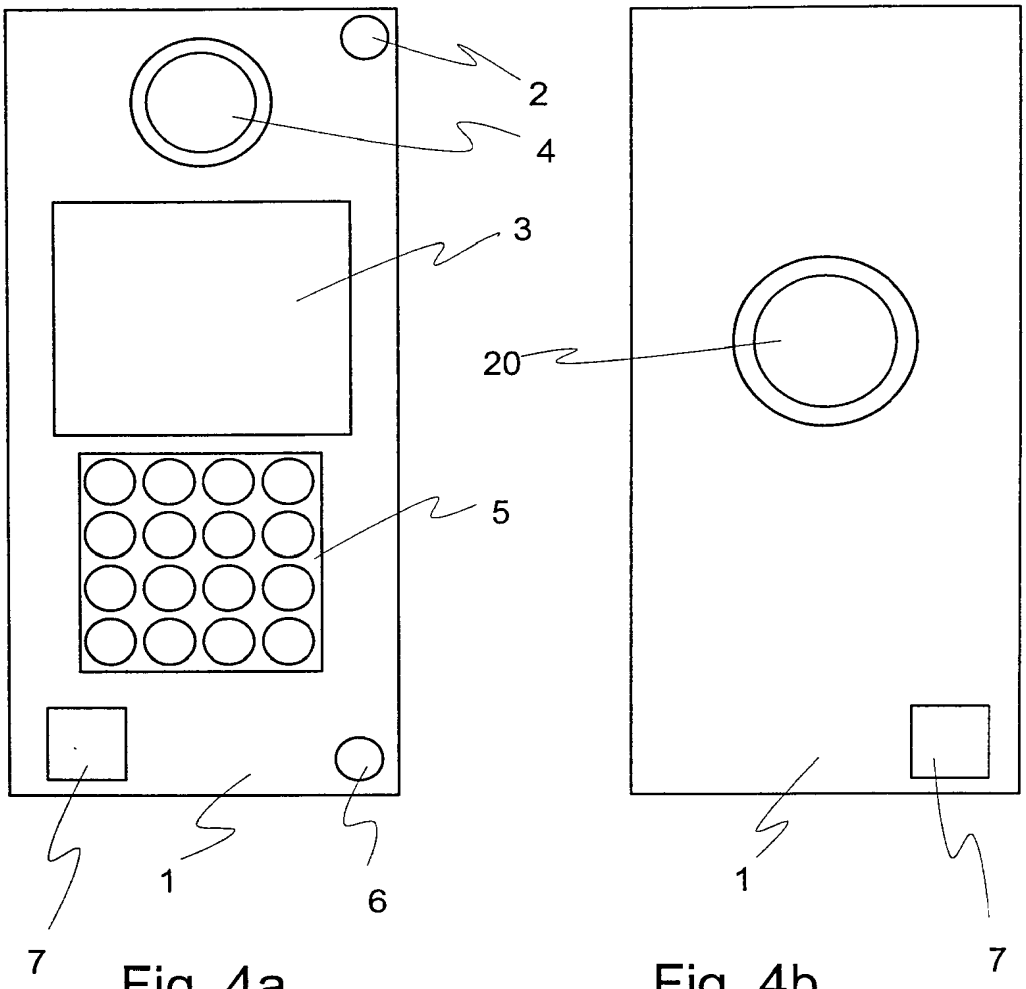


Fig. 4a

Fig. 4b

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00919

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04M 1/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04M, H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0930770 A2 (MITSUBISHI DENKI KABUSHIKI KAISHA), 21 July 1999 (21.07.99), column 8, line 19 - column 10, line 45, figures 5-6B --	1-7
A	WO 9952259 A1 (SIEMENS AKTIENGESELLSCHAFT), 14 October 1999 (14.10.99), page 2, line 26 - page 4, line 29, figures 1-2 --	5
A	DE 19736675 A1 (SIEMENS AG), 25 February 1999 (25.02.99), column 1, line 52 - column 2, line 58, figures 1A-3B, abstract --	5

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
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"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search	Date of mailing of the international search report
15 February 2001	16-02-2001
Name and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Roland Landström/JAn Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00919

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0898405 A2 (HITACHI, LTD.), 24 February 1999 (24.02.99), column 3, line 7 - column 9, line 1, figures 1A-9, abstract -- --------	5

INTERNATIONAL SEARCH REPORT

Information on patent family members

27/12/00

International application No.
PCT/FI 00/00919

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0930770 A2	21/07/99	JP 11205761 A	30/07/99
WO 9952259 A1	14/10/99	DE 19815604 A	14/10/99
DE 19736675 A1	25/02/99	NONE	
EP 0898405 A2	24/02/99	JP 11069214 A	09/03/99
		US 6069648 A	30/05/00